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It deserves, moreover, to be mentioned that a compound isomeric with methylic aldehyde, the dioxymethylene ($C_2H_4O_2$) of M. Boutlerow, is known already; also that a sulphur-compound of the formula



has been obtained by M. Aimé Girard, who observed that bisulphide of carbon is reduced by the action of nascent hydrogen with disengagement of sulphuretted hydrogen.

In the course of next winter I propose to perform some further experiments on the product of the slow combustion of methylic alcohol for the purpose, if possible, of isolating methylic aldehyde in a state of purity, and of thus completing this inquiry.

VII. "On the New Reflecting Telescope to be used at Melbourne, Australia." In a Letter to the President. By the Rev. Dr. ROBINSON, F.R.S. Received October 15, 1867.

Observatory, Armagh, October 14, 1867.

MY DEAR FRIEND,—As you express a wish to know my recent impressions respecting the great telescope, I can say that they are very satisfactory. When I saw it six weeks ago the first of the two great specula was just polished; and though the essential parts of the equatoreal were in position, and one could estimate the facility with which it could be managed, the optical part of the telescope remained incomplete. Now, I found the great and small specula in their places, a finder of four inches aperture attached, the circles divided, and the clock for driving the telescope enshrined in the pier. One thing was wanting, weather fit for trying its power; and during eighteen nights there was only one of even middling goodness. That, however, was sufficient to prove that the instrument is thoroughly up to its intended work. I examined several nebulæ and clusters, with whose appearance in Lord Rosse's six-feet reflector I am familiar, and the difference was far less than I expected. I may specify among them 51 Messier, whose spirals were seen on strong aurora, and the nebula in Aquarius, with its appendages like the ring of Saturn. Its definition of stars is very good: a Lyrae had as small and sharp an image as I ever saw on such a night; and a few pretty close double stars were well and clearly separated. Part of this is probably due to the lattice-tube, which permits the escape of heated air, but more to the figure of the speculum, which is truly parabolic. The peculiar nature of the mounting brings the circles completely within reach of the observer's assistant; and the mechanical appliances for the motions in right ascension and polar distance are so perfect, that we set the instrument on the faint objects which we were examining with great facility and rapidity. One man can reverse the telescope in a minute and a quarter; the quick motion in polar distance is of course far easier, and the slow one acts more like the tangent screw of

a circle than the mover of such a huge mass. The clock is rather gigantic, but does its work with great precision, the objects which I examined remaining steady on the wire as long as I watched them ; and there is an ingenious and new contrivance for suiting its speed to planets or the moon. There remain but a few matters to be completed ; the second great speculum is nearly polished, the glass small one is ready ; the micrometer and observing-chair are not commenced, nor the photographic apparatus and spectroscope. These two last are no part of Mr. Grubb's contract ; but the Committee thought themselves justified by the correspondence in ordering them, as their cost is small, and they will add greatly to the utility of the telescope. In the fine sky of Melbourne it will, I trust, yield spectroscopic results surpassing any that have as yet been obtained *. That it will realize fully the expectations of the people whose enlightened liberality has ordered its construction I am quite certain ; but I am not so certain that it will retain its present perfection *very* long if exposed without some shelter. It is true that Mr. Cooper's great achromatic has stood exposed to the rain and wind of Connaught for more than thirty years, and is still serviceable ; but besides its inferior size it is of coarser workmanship, and is provided with fewer of those beautiful contrivances which in this instrument make its movements so easy. At Melbourne the rain of Markree is not to be feared ; but if one may judge from its position on the verge of a great continent, and from the analogy of India and the Cape, another enemy is to be dreaded, the fine dust which winds from the interior will probably bring. This would find its way into all the bearings, and besides clogging their action would grind them out of truth. The danger of this induces me, after careful discussion with Messrs. Le Sueur and the two Grubbs, to lay before you my views, which (if you think them sound) you may hold it advisable to mention to the authorities of Victoria.

Three modes occur to me of covering the telescope. In any case it must be surrounded by a wall, for the comfort of the observer and to prevent intrusion. This wall may support a moveable covering of such a kind as to let the instrument be pointed to every part of the sky.

The most usual form of this covering is a dome running on a circular railway, and with an opening or chase on one side reaching from its base to its summit, and closed by a sliding shutter. The disadvantages of this plan are, that the performance of the telescope is somewhat injured by currents of warm air rising through the chase, and that it is much heavier and more costly than either of the others. In this instance its diameter could not be less than 56 feet ; and though that magnitude is not beyond the resources of an accomplished engineer, yet it is not one to be encountered without the prospect of some adequate advantage. The largest dome which I know (Sir James South's, of 36 feet diameter) is a total failure ; but this does not weigh much with me—for, though planned by the celebrated Brunel, it transgresses against the elements of mechanical science.

* I send a photograph of the instrument taken last week.

A much simpler plan is the sliding roof. In this case the walls are rectangular, enclosing a space rather broader than the instrument, and about three times as long. The longer sides carry two rails, on which runs a kind of house long enough to cover the instrument and pier, and high enough to clear the latter. That end which at Melbourne will be its north is closed by doors, which are opened at the time of observation, and the roof is wheeled away, leaving all in the open air. It will be the cheapest and least bulky of the three. Its defects are, that the open end presents some engineering difficulty, that the roof will hide about 12° under the pole, and that the whole machinery is exposed to any dust that may be stirring during the hours of observing.

That which appears the best is the revolving roof. Its vertical part is a prism of sixteen sides, six feet high, springing from a ring of cast iron, which revolves by rollers on a circular rail borne by the wall. The top is nearly flat, with a chase large enough to let the telescope work freely, which can be covered by sliding shutters. The tube, when in use, would project through the chase, and be essentially in free air, at other times could be lowered and completely sheltered; while the other parts would be as well protected as under a dome. In this case the internal diameter should be about 46 feet, with a chase 16 feet wide. These dimensions would give complete command of the heavens, and such a roof would give less hold to a high wind than either of the others. I enclose a rough sketch of its framing. The panels and the three girders at the top to be of angle-iron, light but strong, and these covered with tin plate. If it were adopted, I suppose the frame would be made here, sent out in pieces, and put together and covered on its arrival. The weight would be about 5 tons. As to its cost, no estimate can be given, as labour costs more at Melbourne than with us; but in Ireland it would be about £1200.

I will conclude this long letter by telling you how much I am satisfied with our selection of the astronomer who is to work this glorious instrument. He is not a mere mathematician; such a one might be very helpless when he came to the practical details of observing, but he is thoroughly versed in its optical and mechanical requirements, and in the daily work of an observatory. For this last he has been trained by Professor Adams during the past year; one of the Committee, Mr. Warren De la Rue, the first of celestial photographers, has instructed him in the mysteries of that surprising art; and for the last three months he has been constantly in Mr. Grubb's works, studying all the mechanism of the telescope (of which I see he has acquired full command), and taking an active part in the polishing of the great specula. He seems fully to understand this most delicate process; and it is my opinion that, if repolishing becomes necessary, he is fully competent to do it successfully.

I may therefore congratulate you in full hope on the inestimable harvest of discovery and triumph which will soon crown this magnificent enterprise.

Yours ever,

(Signed) T. R. ROBINSON.